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Banking Crisis vs. Credit Crunch? A Cross-Country Comparison of Policy Responses to Dilemmas in Banking Regulation

Thomas Bernauer and Vally Koubi

Abstract

Restrictive policies aimed at reducing the likelihood of bank failure during recessions tend to increase the probability of a credit crunch. In this paper we infer governments' policy responses to this dilemma by studying the cyclical behavior of bank capital in 1369 banks from 28 OECD countries during the period 1992-98. We find significant differences across countries. In the US and Japan, bank capital is counter-cyclical, that is, the typical bank strengthens its capital base during periods of weak economic activity. In the other countries, there is no relationship between the level of macroeconomic activity and bank capital. From these findings we infer that severe banking crises in the US and Japan may have made policymakers there more vigilant towards “unhealthy” banks, even when this implies an increase in the risk of a credit crunch. In countries without such crisis experience, policymakers seem to be less concerned about future banking crises. Our results suggest that the strong push by the US for the 1988 Basle Accord may have been a reflection of this increased sensitivity. They also suggest that, to the extent business cycles do not develop in synchronicity across countries and policymakers respond differently to the banking crisis-credit crunch dilemma, current reforms of the Basle Accord, which are designed to tighten regulatory requirements, may encounter difficulties.

KEYWORDS: Regulation, Bank Capital, Credit Crunch, Banking Crisis, Recession, Basle Accord

Introduction

Returns on bank assets decrease during recessions. Some borrowers fail to repay, or they restructure loan repayments (Mitchell 1941). Returns on banks' securities portfolios decrease due to declining stock markets, and so on. Deterioration in aggregate economic conditions can thus undermine the viability of some banks, especially those with a small capital base. Japan is a prominent example. The recession in Japan in the early 1990s and the associated stock market collapse led several Japanese banks into insolvency.

The increase in the probability of bank failures (see Gorton 1988 for a discussion of the historical evidence) creates a serious policy dilemma. If regulators intervene - by toughening capital and other requirements or by enforcing existing ones more strictly - they may succeed in lowering the probability of bank failure and averting banking crises. But their actions could lead to a credit crunch (Berger, Kyle and Scalise forthcoming; Gorton and Winton 2000). A credit crunch could further exacerbate the recession and create a vicious circle. It arises from the fact that banks typically respond to a higher capital-asset requirement¹ by reducing their assets, that is, by cutting back loans. The credit crunch that followed the banking crisis in Asia in 1997-98 had significant amplification effects on macroeconomic conditions and clearly demonstrates this possibility (Burnside, Eichenbaum and Rebello 2001).

In this paper we seek to infer the preferences (aversion) of policymakers regarding these two "evils" from the behavior of banks. To this end, we study the cyclical behavior of bank capital-asset ratios in a sample of more than 1300 commercial, savings and cooperative banks from 28 OECD countries during the period 1992-98.² Previous research on the issues of bank failure and credit crunch focuses exclusively on banks in individual countries – primarily US banks. Examining the bank failure-credit crunch dilemma with data for a larger number of countries enables us to fill an important gap in the public policy and political economy literature.

¹ Capital-asset requirements are the key element in most national and international banking regulations. They specify how much capital a bank must hold in relation to its (usually risk-weighted) assets. The according ratio is expressed in percentages. See www.bis.org.

² Since the late 1980s, most OECD countries (and some other countries as well) have placed risk-weighted capital-asset ratios at the center of their prudential regulation in the banking sector. Most countries use the so-called Basle Accord definitions to calculate banks' capital and to relate this capital to assets that are weighted according to their risk. Banks are required to hold more capital against more risky types of assets. A bank's overall risk-weighted capital-asset ratio (we use the so-called Tier 1 ratio in this paper) captures in a rather simple form the overall risk-profile of a bank.

We find that in the whole sample the association between bank capital and the strength of the economy in the country where the respective bank is located is negative (that is, a counter-cyclical pattern). We then partition the sample along country lines in order to examine whether country-specific patterns exist. We find that the counter-cyclical pattern obtained in the whole sample is due to two countries: namely, the United States and Japan. In the other countries (or groups of countries), there exists no relationship between the business cycle and bank capitalization.

What do these findings imply for policymakers' relative preferences (aversion) with regard to risks of bank failure and credit crunch? The fact that bank capital is strongly counter-cyclical means that the risk of bank failure decreases during recessions while that of a credit crunch increases. However, this result only holds true for the US and Japan, two countries that have experienced severe banking crises in the past two decades (notably, the S & L crisis in the US in the 1980s, and the crisis in Japan in the 1990s). We interpret this finding as suggesting that policymakers' preferences reflect country-specific experience. In the US and Japan, but not in the other countries examined, the preferences of policymakers seem to tilt towards preventing trouble in the banking sector, while downplaying the possibility of a credit crunch. While we cannot rule out the possibility that there may exist other differences across countries that generate this pattern, we have not been able to identify any such differences. Moreover, recent empirical work indicates that there is systematic variation in the supervisory (regulatory) environment over the business cycle (see Berger, Kyle and Scalise, forthcoming). This suggests that regulators play a major role in determining bank capital-asset ratios over the business cycle.

The remainder of the paper is as follows. Section 1 reviews the existing literature on bank regulation, banking crises, and the credit crunch problem. Section 2 presents the results of the empirical analysis, and section 3 offers the conclusions.

1. Banking crises, capital adequacy requirements, and credit crunch

Government regulation is usually justified in terms of market failures emanating from public goods, externalities, monopolies, or information asymmetries between buyers and sellers. Conventional wisdom holds that bank regulation is needed because depositors have a limited ability to monitor their banks' financial soundness (asymmetric information), and because there is a risk of systemic crisis (an individual bank failure leading to a banking crisis or a wider bank panic). A banking crisis can occur in two distinct ways. a) When banks become insolvent as a result of weak fundamentals; and b) when banks face a

liquidity problem as depositors request a transformation of their deposits into currency, a request that the banking system cannot satisfy so that the convertibility of deposits into currency is suspended (a bank run).

Two types of theories have been advanced to explain the latter form of banking crises. The first one views bank runs as random events that are unrelated to the real state of the economy and are rooted in the collective beliefs of the individuals. As Diamond and Dybvig (1983) point out, "...anything that causes [depositors] to anticipate a run will lead to a run." (p.410) Possible causes include "a bad earning report, a commonly observed run at some other bank, a negative government forecast, or even sunspots." (p. 410) The first-come-first-served rule for bank repurchases of deposits (i.e., the return a depositor receives depends on his place in line at the bank) also adds to the probability that a bank will collapse.

The second type of theory argues that bank crises and failures are related to the occurrence of events that change the perceptions of the depositors about the risks banks take. Because of information asymmetry between banks and depositors, depositors cannot accurately assess the risk of individual banks and thus resort to aggregate information. All banks may thus be perceived to be riskier, even if only a few in fact are. In such cases, depositor demand for currency may be so large as to cause a crisis. In other words, the collapse of one bank, or even the possibility of it, may spill over to other banks and damage the entire economy. In the past two decades more than 130 countries have suffered from very costly episodes of banking problems, with costs to resolve bank failures amounting from 10 to 30 percent of GDP (Barth, Caprio, and Levine 1998).

This type of theory assumes that banking crises are mainly caused by recessions³ because depositors think it is more likely for a bank to fail during bad times. According to this interpretation, a banking crisis is not a random event but a response to unfolding economic circumstances. In other words, bank failures are an integral part of the business cycle. Mitchell (1941) and Gorton (1988) see recession as being the primary cause of bank panics⁴. Gorton (1988) observes, "...during the National Banking Era every major business cycle downturn was accompanied by a banking panic. During this period (1863-1914) seven of the eleven cycles contain panics." (p. 755). Demirguc-Kunt and Detragiache (1997) also study the factors associated with the emergence of systemic banking crises in a sample of developed and developing countries in the 1981-1994 period. They find that a weak macroeconomic environment, particularly low GDP growth,

³ Extreme seasonal fluctuations and the unexpected failure of a large financial corporation are two more possible causes of a bank panic that have been mentioned in the context of this type of theory (see Gorton 1988).

⁴ Gorton (1988) does not find evidence of a reverse causality and concludes that "...liabilities of failed businesses do Granger-cause losses on deposits." (p.778)

significantly increases the probability of a systemic crisis, thus confirming the evidence presented by Gorton (1988).

Finally, Dwyer and Hafer (2001) examine whether a bank's *ex ante* riskiness (i.e., bank capitalization) is a reliable guide to its fate in a crisis. Using data on bank runs on selected US state banking systems in 1860 (when many banks failed) they compare the riskiness of banks that failed with the riskiness of other banks. They measure riskiness with a bank's portfolio and its leverage (the ratio of bonds to capital) since this measure reflects the risk borne by stockholders. They find that riskier banks were more likely to fail during this time and holders of notes in such banks were more likely to suffer losses.

The probability of a banking crisis caused by a run can, in principle, be reduced or eliminated by a variety of measures, such as the development of "narrow banks" (i.e., banks that invest only in low risk securities), funding banks with equity rather than demand deposits, using central banks as lenders of last resort (Bagehot 1873), and offering government deposit insurance (Diamond and Dybvig 1983). However, the probability of a banking crisis resulting from bank misbehavior (weak fundamentals) rather than a run is more likely to increase as a result of such measures since some of them can lead to moral hazard, as is the case with the lender of last resort and with deposit insurance.⁵

Requiring banks to increase their capital⁶ seems to be the obvious regulatory response⁷ to the risk of a systemic crisis because it improves the soundness and safety of the banking sector. It is widely assumed that requirements forcing banks to hold sufficient⁸ capital may change their incentives to take risks.⁹ When a bank is forced to hold a large amount of equity capital, especially the bank's owners (shareholders) have more to lose if the bank fails – provided, of course, shareholders are able to monitor and control the bank's management. Such banks are thus more likely to pursue less risky activities. Sufficient capital also

⁵ For example, Kane (1989) identifies the US financial safety net, especially the fixed-rate deposit insurance, as the single most important factor in explaining the Savings and Loans crisis of the 1980s. Similarly, Demirguc-Kunt and Detragiache (1997) find international evidence that the existence of an explicit deposit insurance scheme increases the probability of systemic banking problems.

⁶ Bank capital (usually measured in terms of capital-asset ratios) contributes to preventing bank failure and the amount of capital affects returns for the owners (equity holders) of the bank. See Berger, Herring and Szego (1995) for the role of capital in financial institutions.

⁷ See Santos (2000) for an excellent review of the literature on bank capital regulation.

⁸ We use the term "sufficient" in a rather vague manner at this point. The financial economics literature does not provide yardsticks for assessing how much capital is enough. Indeed, work by Berger et al (1995) shows that there is no absolute criterion for the optimal capital level.

⁹ Other regulations that may reduce the risk-taking propensity of banks include requiring banks to issue subordinated debt, extending the liability of bank shareholders, and restricting banks from holding risky assets such as common stock.

protects banks against unexpected losses and, by signaling solvency and liquidity to depositors and other investors, reduces banks' borrowing costs and the likelihood of bank runs (Bernauer and Koubi 2002).

Until the late 1980s, the regulation of bank capital was largely a domestic matter. With the growth of international banking since the 1970s, however, the need to ascertain the safety and soundness of the international banking system as a whole also grew. Developments during the 1980s such as the Third World debt crisis, the growth in off-balance-sheet activities, rapid technological change, and increased competition among international banks eroded the capital bases of many intermediaries and led to an increase of bank risk. Divergent national capital rules appeared to give banks subject to laxer capital requirements a competitive advantage over banks subject to stricter rules. Moreover, cross-country comparisons of capital levels of banks were difficult because there were no internationally applicable standards for measuring capital.

The Basle Accord, reached in July 1988 and fully implemented from December 1992 on, provides a partial solution to these problems. It applies to credit risk, harmonizes the measurement of capital, and mandates minimum capital to risk-weighted asset ratios. Its goals were (and still are) to reduce risks in the international banking system and to minimize competitive inequality¹⁰ arising from differences among national bank-capital regulations.¹¹ Regulatory capital requirements (national and/or international) may, however, have unintended consequences, including a contraction in bank lending (i.e., a credit crunch).

In addition to pressure from regulators, banks may also have their own reasons for increasing their capital during recessions, for instance, in order to signal to the market that they are sound and hence attract deposits at lower cost. Banks can increase capital either by raising new capital or by restricting their asset growth through a reduction in lending. Because raising new capital is difficult for banks during recessions, many banks are likely to focus more on loan reduction. Unfortunately such reduction in the supply of loans can cause a credit crunch¹².

A credit crunch occurs when banks refuse to make loans even though borrowers are willing to pay the stated interest rate or even a higher rate. Banks

¹⁰ Wagster (1996) argues, however, that the Basle Accord did not minimize competitive inequality because it failed to address a funding-cost advantage of Japanese banks.

¹¹ Kane (1990) claims that the Basle Accord is a cartel-like agreement among G-10 and EU bank regulators designed to limit regulatory competition. He also claims that non-Japanese regulators tried to use the Basle Accord to roll back Japanese penetration of European and American financial markets.

¹² A slowdown in economic activity may also reduce the demand for loans by individuals and businesses. However, the available evidence points to banks' refusal to lend as the main reason for credit crunches (Wagster, 1999).

thus restrict the size of loans made to less than the full amount. Because of asymmetric information between lenders and borrowers, banks choose to ration credit to avoid adverse selection and negative incentive effects. Raising interest rates might reduce bank profits if adverse selection increases the average riskiness of potential borrowers and if incentive effects induce borrowers to switch from safe to risky projects after obtaining the loan. Moreover, by granting loans to borrowers that are not as large as the borrowers want banks maximize the probability of loan repayment as more borrowers repay their loan if the loan amounts are small (Mishkin 1997).

Hancock and Wilcox (1993), Berger and Udell (1994), and Shrieves and Dahl (1995) investigate whether during 1990-1991 US banks voluntarily made fewer loans to reduce risk. Hancock and Wilcox, and Shrieves and Dahl find that this factor played a role in the reduction of loans. Berger and Udell, on the other hand, find little support for this hypothesis.

Many analysts have blamed the credit crunch in the United States in the early 1990s on changes in regulatory capital requirements¹³. Furlong (1992), Haubrich and Wachtel (1993), and Berger and Udell (1994) examine whether the 8% capital backing for loans to the private sector required by the 1988 Basle Accord encouraged banks to reallocate their assets from loans to government securities, which require only 0-1.6% capital backing. With the exception of Berger and Udell, the other authors find evidence that the risk-based capital requirement mandated by the Basle Accord significantly contributed to the credit crunch.

Moreover, stories in the financial press blamed the Basle Accord's risk-based requirements for causing banks in many countries to restrict credit (Lascelles 1990; Breeden and Issac 1992). Several researchers also claim that the tightening of capital requirements contributed to credit crunches in many countries around the world and to the depth and length of the financial crisis of East Asian economies. Wagster (1999), for example, finds that the Basle Accord forced banks in Canada, the United States, and the United Kingdom to reallocate assets from loans to securities, thus contributing to a credit crunch. Finally, Chiuri, Ferri and Majnoni (2001) argue that enforcement of the Basle capital-asset requirements significantly curtailed credit supply, particularly at less-well capitalized banks in emerging economies where the credit channel is more important since alternatives to bank credit are less developed.

¹³ Other possible explanations that are unrelated to regulatory capital requirements and may also help in explaining the observed reduction in lending during this period include: depletion of bank capital because of loan loss experiences in the late 1980s; greater regulatory scrutiny (Peek and Rosengren 1995); reduction in loan demand by businesses because of macroeconomic/regional recessions (Bernanke and Lown 1991); and secular decline in the demand for bank loans because of the growth of alternative sources of credit (Berger and Udell 1994).

To summarize, recessions increase the probability of bank failure. To reduce this risk, policymakers can introduce new or enforce more rigorously existing regulations aimed at strengthening bank capital. As this strengthening typically takes place through a reduction in credit creation, it can cause a credit crunch, which in turn may exacerbate the recession. Consequently, policymakers face a dilemma between ascertaining the safety of the banking system and preventing deterioration in aggregate economic conditions.

A substantial body of work has examined how recessions cause bank failure and how regulatory tightening causes credit crunches. However, we are not aware of any work that examines how regulators behave in the presence of the mentioned policy-dilemma. With a few exceptions (see Peek and Rosengreen, 1995)¹⁴ it is not possible to characterize policy and hence to determine how much policymakers favor one risk relative to the other. In the next section we study the cyclical behavior of bank capital-asset ratios as a means of inferring how policymakers have responded to the policy dilemma – i.e., whether they lean more towards averting a banking crisis or more towards exacerbating a recession.

One may object to our description of the policy dilemma by arguing that a forward-looking regulator need not wait until the economy has slipped into a recession before tightening up regulation in order to avert a banking crisis. That is, one may claim that a better timing of regulation could eliminate the policy dilemma. Unfortunately, this does not seem to represent a realistic policy option due to significant uncertainty regarding both the evolution of the economy and the likelihood of liquidity and solvency problems in the banking sector. The dilemma faced by the monetary authorities in the US in early 2004 helps illustrate the practical importance of this point. Following the recession of 2001-2002 economic performance in the US seemed unusually fragile. While the growth rate of output was high, employment growth was negligible. This created a dilemma for US monetary authorities. They could maintain a policy of loose money and low interest rates. But while this would support economic growth, it carried the risk of allowing inflation to take off. This was due to the fact that there are long and variable lags regarding the effects of monetary policy, so if the central bank waited until the signs of inflation were imminent before it acted, its actions would come too late to contain inflation in the short term. Or, policymakers could exhibit vigilance towards inflation and raise interest rates preemptively on the assumption that the economy was strong enough to painlessly absorb the effects of tighter

¹⁴ Peek and Rosengren (1995) focus on lending by banks in New England from 1989 to early 1990s that were subject to formal regulatory mandate to improve their capital ratios. They find that banks under enforcement actions reduced lending more than other banks in the same region with the same capital to asset ratios, and they conclude that credit tightening reflects a response forced by bank regulators to increase capital ratios rather than voluntary behavior of banks' management.

monetary policy. Of course, the risk with such a policy is that it could cut off the economic expansion. The authorities in charge of price stability (the US FED) must take a position under conditions of tremendous uncertainty. As of June 2004, when this article went to press, US monetary authorities seemed to have decided to gamble that inflation would remain contained (perhaps due to exceptional productivity growth) and had *not* raised interest rates¹⁵ in spite of signs of inflation *and* the knowledge that the effects of policy changes only affect inflation with a substantial lag (that is, a monetary tightening takes typically a couple of years before it has any effects on inflation). Hence, those entrusted with preventing inflation seem to have chosen to accept a substantial inflation risk in order not to risk derailing the current economic recovery.

The problem faced by regulators of the banking system is quite similar. Their mandate is to maintain stability in the banking system, but at the same time, they are under political pressure (as the US FED is in monetary policy) not to undertake actions that endanger growth and jobs. It is not surprising then that they may often opt to wait until there are strong signs of turmoil in the banking sector (inflation in the case of the FED) before they act.

Our main point is that it is the state of the business cycle that affects the trade offs faced by policymakers. One may also want to ask how the trend of economic growth (rather than the state of the business cycle) affects policy decisions. If one takes the view that rational politicians focus mostly on short term developments (because of reelection concerns), then the trend is of no relevance for policy making. If one is willing to claim that the long term overrides the short run in political decisions then the policy trade off disappears as the policy dilemma arises purely from cyclical concerns. In other words, policymakers concerned mainly about the long term growth path will discount credit crunches (which only have cyclical –transitory- effects) and will simply try to keep the banking system in good shape (which matters for the long term growth path).

2. Empirical analysis

We use a data set consisting of yearly observations for a total of 1369 commercial, savings and cooperative banks in 28 OECD countries over the period 1992 – 1998 (Table A1 in the Appendix describes the countries included in the analysis). The banking data was constructed from data provided by Bankscope (see Table A2 in the Appendix for variable definitions). The dependent variable in

¹⁵ Chairman Greenspan indicated that the FED would react vigorously to any strong signs of accelerating inflation and the markets expect a small increase in the rates in late June. But the point is that monetary policy needs to act early in order to contain inflation because of the long and variable lags involved in the transmission mechanism.

the analysis is the capital-asset ratio, k_{it} , defined here as the *Tier 1 capital ratio* (Tier 1 capital divided by total risk weighted assets). The 1988 Basle Accord established a common international definition of bank capital that divides capital into two tiers.¹⁶ Tier 1 capital is common to all signatory countries and consists of common stockholder equity and disclosed reserves (except for some forms of preferred stock that U.S. bank holding companies also include). Tier 2 capital, which consists of leeway elements that at least one of the signatory countries considers to be bank capital, can include any combination of eligible capital elements permitted by national regulators. Assets are weighted by a risk factor (e.g., 0 for government bonds, 1 for credits extended to companies, and so on.) The minimum capital base mandated by the Basle Accord is 8 percent, with at least half of this met by Tier 1 capital. Because of differences across countries in the measurement of Tier 2 capital, meaningful cross-country comparisons of the capital holdings of banks can be made only on the basis of Tier 1 capital.

The main explanatory variable in the analysis is real **gdp** growth in the country where a given bank is located during the period 1992-1998.

As control variables we use characteristics of banks such as *return on equity*, **roe**, and the share of *non-performing loans*, **nonp**. The return on equity is a measure of the return on shareholder funds and serves as an indicator of vulnerability and also of the possible difficulties a bank may have in raising new capital. **Roe** is constructed as the ratio of net income to average equity. Non-performing loans is a measure of the amount of total loans which are doubtful and is used as an indicator of bank vulnerability. **Nonp** is constructed as the ratio of non-performing loans to gross loans. We also consider control variables related to bank size such as the *total value of assets*, **asset**, and the *number of employees*, **emp**. Both variables are associated with a bank's reputation, stability, etc., and it is plausible that larger banks are more likely to stay open during bank crises although there is no strong theoretical reason to expect any particular relationship. Tables 1 and 2 report various summary statistics as well as the correlation coefficients for the variables used in the regressions.

¹⁶ Recent reforms of the Basle Accord have defined additional capital ratios. But these are of little relevance to this analysis.

Table 1
Summary Statistics for Data Used in the Regressions

Variable	Obs	Mean	Std. Dev.	Min	Max
k	7100	14.53875	14.64704	-3.5	340.6
gdp	10886	2.735683	1.652996	-6.69	10.73
asset	8983	1.87E+07	6.30E+07	0	8.30E+08
empl	7229	2503.714	8323.407	0	149800
roe	8971	10.18555	15.91372	-712.08	248.2
nonp	6571	2.626498	4.850514	-0.51	70.78

Table 2
Correlation Coefficients

	k	gdp	asset	Empl	roe	nonp
k	1					
gdp	-0.0287	1				
asset	-0.118	-0.0653	1			
empl	-0.133	-0.0224	0.8975	1		
roe	-0.0949	0.1429	0.0085	0.0374	1	
nonp	0.0138	-0.3414	0.0458	0.0639	-0.1995	1

To estimate the cyclical behavior of the capital-asset ratio we rely on pooled cross-section time series regressions with a random-effects procedure¹⁷. Table 3 reports the results from a regression of **k** on **gdp** and the set of control variables for the entire population of banks in the dataset.

¹⁷ Estimates were obtained using the xtreg procedures in STATA. We also run fixed effects regressions and obtained almost *identical* results. The Hausman specification test suggested that the random effects estimation is appropriate.

Table 3

Dependent variable: Tier 1 capital (k)
Random-effects regression: All countries

	Coef.	Std. Err.	P> z
gdp	-.4326927	.1555335	0.005
asset	-1.40e-08	1.25e-08	0.265
empl	-.00006	.0000657	0.361
roe	-.0413611	.013283	0.002
nonp	.0146583	.0564819	0.795
cons	17.66347	.699042	0.000

N = 5375 R-sq = 0.0230 Prob > chi2 = 0.0000

The estimated coefficient on **gdp** is negative, which indicates counter-cyclical variation in the capital-asset ratio. More specifically, the estimated coefficient implies that a reduction in the economic growth rate by one percentage point leads to an increase in bank capital - computed at the sample average value - of about two percentage points (which correspond to an average increase of about 15%). This effect is quite substantial.

The other coefficients suggest that higher returns on equity lead to lower capitalization while bank size and a large share of non-performing loans do not have a statistically significant effect on bank capitalization. A possible interpretation of the negative effect of **roe** is that banks that keep their shareholders happy can expand their lending activities more easily without much questioning and monitoring by their shareholders. Those with low returns on the other hand may be forced to restrict their lending and improve the quality of their portfolios. This explanation is based on Jensen's (2000) suggestion that managers of firms with satisfied shareholders have a free hand to pursue "empire building" activities (such as mergers, acquisitions, general expansion, and so forth).

The next task is to determine whether the observed counter-cyclical pattern is uniform across countries, or whether it reflects the experience of particular countries. Tables 4-9 report regression results from various data partitions. Note that there is slight variation in the list of control variables used in the regressions across countries due to data availability (in particular concerning the variable **nonp**).

Table 4

Dependent variable: Tier 1 capital (k)
Random-effects regression: US, Japan, Germany, UK

	Coef.	Std. Err.	P> t
gdp	-.4536356	.2038071	0.026
asset	-1.77e-08	1.42e-08	0.213
empl	-.0000525	.0000758	0.489
roe	-.0590741	.0150418	0.000
nonp	.0846827	.079345	0.286
cons	18.07181	.8852954	0.000

N = 4206 R-sq = 0.027 Prob > chi2 = 0.0000

Table 5

Dependent variable: Tier 1 capital (k)
Random-effects regression: Germany

	Coef.	Std. Err.	P> t
gdp	.0916291	.1980971	0.644
asset	-2.75e-09	2.72e-09	0.311
empl	3.52e-06	.000027	0.896
roe	.0455735	.0280178	0.104
cons	6.414516	.4459026	0.000

N = 116 R-sq = 0.11 Prob > chi2 = 0.25

Table 6
Dependent variable: Tier 1 capital (k)
Random-effects regression: Japan

	Coef.	Std. Err.	P> t
gdp	-.1907489	.0317999	0.000
asset	-3.36e-09	1.09e-09	0.002
cons	6.848219	.3342818	0.000
N = 144			
R-sq = 0.35		Prob > chi2 = 0.0000	

Table 7
Dependent variable: Tier 1 capital (k)
Random-effects regression: UK

	Coef.	Std. Err.	P> t
gdp	-.1339728	.8138444	0.869
asset	-1.42e-08	2.21e-08	0.521
empl	-.0000128	.0000946	0.892
roe	-.2384457	.0631049	0.000
cons	16.39124	2.620948	0.000
N = 146			
R-sq = 0.19		Prob > chi2 = 0.0000	

Table 8
Dependent variable: Tier 1 capital (k)
Random-effects regression: USA

	Coef.	Std. Err.	P> t
gdp	-.4653905	.2068078	0.024
asset	-2.13e-08	3.14e-08	0.496
empl	-.0000375	.0001278	0.769
roe	-.0556407	.0151598	0.000
nonp	.09235	.0797723	0.247
cons	18.1094	.898995	0.000

N = 4150 R-sq = 0.025 rob > chi2 = 0.0000

Table 9
Dependent variable: Tier 1 capital (k)
Random-effects regression
Countries other than the US, UK, Germany and Japan

	Coef.	Std. Err.	P> t
gdp	-.0710791	.1954209	0.716
asset	1.55e-09	1.48e-08	0.917
empl	-.00001317	.0000936	0.159
roe	.0310017	.0222541	0.164
nonp	-.0047155	.0813108	0.954
cons	16.28844	1.1218	0.000

N = 1169 R-sq = 0.019 Prob > chi2 = 0.25

An interesting pattern emerges from this analysis. Namely, the overall counter-cyclical pattern reflects primarily the behavior of US and Japanese banks. Banks in the other countries exhibit neither pro- nor counter-cyclical variation in their capital-asset ratios.

We interpret these findings as follows. The US and Japan are countries that have recently experienced severe banking crises: that is, the savings and loans crisis in the US in the second half of the 1980s, and the banking crisis in Japan in the 1990s¹⁸. Our finding of a counter-cyclical pattern exclusively in these two countries suggests that policymakers' preferences may vary as a function of country-specific experience regarding the banking sector. The occurrence of a severe banking crisis seems to tilt the preferences of policymakers towards preventing bank liquidity and insolvency problems, while downplaying the possibility of a credit crunch. Countries without direct experience of a banking crisis show less sensitivity to systemic bank risk.

An alternative interpretation of our findings might claim that not tougher regulators but more competitive markets have caused the counter-cyclical pattern in the US and Japan. As noted above, we should expect that depositors and investors become more nervous about bank vulnerability in periods of recession. The more competitive and transparent banking systems are the more banks in these systems will try to increase their capital ratio during recessions to signal their "healthiness" to depositors and investors and thus reduce funding costs. Such "signals" are less necessary in periods of strong economic growth and in less competitive and transparent banking systems.¹⁹

Such an argument is *prima facie* plausible for the United States, but very difficult to test. Among other things, we would have to show that the banking sector in the United States is more transparent and competitive than banking sectors elsewhere, while authorities in all Basle Accord countries are equally strict in enforcing regulations.²⁰ We are not aware of any study along these lines. However, the proposition that market pressure caused the counter-cyclical pattern in Japan is very unlikely to find empirical support. The banking crisis in Japan in the 1990s is not least the result of a combination of non-transparent, competition-limiting practices, and lax enforcement of existing regulations.

Finally, it is possible that there is some other difference across countries that is responsible for this pattern and which has not been taken into account by

¹⁸ Finland and Sweden also experienced problems in their banking sectors in the late 1980s. A possible explanation for the lack of a counter-cyclical pattern in these two countries may be that their unemployment rate was very high at that time, making the two governments think twice about inducing a credit crunch through tightened banking regulation. Note also that the number of banks from these two countries included in our sample is very small, so their behavior may not be representative of that of the entire banking sector, not to mention the lack of statistical power in our tests.

¹⁹ It is not surprising then that trouble in the banking sector often builds up almost invisibly during economic booms and breaks open during economic downturns.

²⁰ Virtually all studies on banking regulation circumvent the problem of distinguishing between market and regulatory pressure on banks.

our analysis. For instance, it might be the case that borrowing by firms is much more sensitive to the state of the business cycle in the US and Japan relative to the other countries. Such a strong counter-cyclical in the demand for loans could generate counter-cyclical in capital-asset ratios in these two countries. We do not find this explanation plausible. There exists no a priori reason for American and Japanese firms to exhibit greater sensitivity to the business cycle than firms in other countries. Moreover, the well-known fact that US firms are much less dependent on bank financing than their foreign counterparts (with the exception of the UK) would indicate lower rather than higher sensitivity of the demand for bank loans in the US.

3. Conclusions

Recessions pose a serious dilemma for policymakers. If policymakers focus stringently on bank solvency, they may increase the probability of a credit crunch. If they focus on *short run* macroeconomic stabilization, they may contribute to a higher probability of bank failures.

In this paper we have studied the cyclical behavior of bank capital to infer how policymakers respond to the dilemma. Our results suggest that the dilemma influences banking policy. Regulators in countries that have suffered a recent banking crisis seem to be more sensitive to the problem of systemic risk and are keen to prevent another banking crisis by tightening regulation during recessions, even at the expense of increasing the risk of a credit crunch. This induces a counter-cyclical pattern in bank capitalization. No such sensitivity is observable in countries without a recent banking crisis experience.

Our findings also offer a possible explanation for why the United States pushed so hard for the 1988 Basle Accord (Murphy 2004, Kapstein 1994). As noted above, the Accord and its revisions since 1988 have introduced standardized measures for bank capitalization and have installed minimum bank capital-asset ratio requirements. The process was initiated by the United States. The US first convinced (and to some extent also coerced) the United Kingdom and Japan to conclude a trilateral agreement. The later agreement was subsequently “multilateralized” through the Basle banking committee, a body associated with the Bank for International Settlements.

Some scholars have claimed that the US effort aimed primarily at improving the international competitive prospects of US banks (Oatley and Nabors 1998) by imposing presumably costly regulation on all internationally active banks. An alternative interpretation, suggested by the results presented in this paper, may be that the US effort reflected genuine concerns about national and global systemic bank risk.

Finally, to the extent that business cycles do not develop in synchronicity across countries and policymakers respond differently to the banking crisis-credit crunch dilemma, current reforms of the Basle Accord, which are designed to tighten regulatory requirements, may encounter difficulties.

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Appendix

Table A1: Countries and types of banks

Country	Number of banks	Comm ^a	Coop ^b	Invest ^c Secur	Real Estate	Saving	Credit Bank ^d	Govt Credit ^e
Australia	18	13		4	1			
Austria	7	4	1			2		
Belgium	4	3					1	
Canada	27	22	1	4				
Czech. Republic	1	1						
Denmark	76	51		2	3	20		
Finland	10	8	1			1		
France	41	28	9	2		1	1	
Germany	34	11	3	1	5	1	2	11
Greece	1	1						
Hungary	5	5						
Iceland	4	3				1		
Ireland	7	6		1				
Italy	296	71	147	1	1	54	8	14
Japan	39	34	3				2	
Korea	8	7						1
Luxembourg	4	3		1				
Mexico	7	6						1
Netherlands	14	10	1	1		1	1	
New Zealand	6	6						
Norway	28	9		1	2	14	2	
Poland	2	2						
Portugal	11	6		2	1	2		
Spain	41	12	2	1		25	1	
Sweden	18	5		1	8	3	1	
Switzerland	8	5		1				2
Turkey	1	1						
UK	40	22		2	16			
US	344		4		266	1		

^a Commercial banks

^b Cooperative banks

^c Investment/Securities banks

^d Medium and Long Term Credit banks

^e Specialized Government Credit Institution

Table A2: Variables

<i>Name</i>	<i>Description</i>	
K	Ratio of tier 1 capital to total risk-weighted assets	Source: Bankscope **
Roe	Net income/average* equity	Source: Bankscope
Nonp	Non-performing loans to total loans (%)	Source: Bankscope
Asset	Total assets (USD 000)	Source: Bankscope
Empl	Number of employees	Source: Bankscope
Gdp	Real GDP growth rate in the country	Source: IFS***

The data are from 1992-1998 and include 1369 commercial and cooperative, banks from 28 OECD countries. The share of commercial banks in this sample is around 90-95%.

* “Average” means that equity is averaged using the arithmetic mean of the value at the end of year t and t-1.

**BANKSCOPE is a commercially available database that contains detailed consolidated and/or unconsolidated balance sheet and income statement data for around 13,000 public and private banks around the world for up to 8 years. It is based on data from Fitch Ratings and 6 other sources. See <http://www.bvdep.com/BANKSCOPE.html>

*** The International Financial Statistics are collected and made available by the International Monetary Fund. See <http://ifs.apdi.net/imf/about.asp>.

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